



**EXHIBIT A
PROPOSAL COVER PAGE**

Proposal Type

- Concept Proposal for Demonstration Projects and Processes

Organization Name (Lead Applicant)

Sonoma Ecology Center

Organization Type

- Federally recognized Indian Tribe
- California State Indian Tribe
- Public agency
- Local or state agency/special district
- Resource Conservation District
- Non-profit organization
- Public utility
- Other: _____

Sonoma Ecology Center

Contact Name/Title

Name: Raymond Ballar

Title: Biochar Projects Manager

Email: raymond@sonomaecologycenter.org

Phone Number (include area code): 707 291-3240

Organization Address (City, County, State, Zip Code):

P.O. Box 1486 Eldridge, CA 95431

Authorized Representative (if different from the contact name)

Name: Richard Dale

Title: Executive Director

Email: richard@sonomaecologycenter.org

Phone Number (include area code): 707 996-0712

Certification of Authority

By signing below, the person executing the certificate on behalf of the proposer affirmatively represents that s/he has the requisite legal authority to do so on behalf of the proposer. Both the person executing this proposal on behalf of the proposer and proposer understand that the NCRP is relying on this representation in receiving and considering this proposal. The person signing below hereby acknowledges that s/he has read the entire Request for Proposals document and has complied with all requirements listed therein.

Official Authorized to Sign for Proposal



Signature

3-13-20

Date



Statement of Qualifications

North Coast Resource Partnership Grant
Concept Proposal for Biochar Demonstration Use of
Portable Field Kilns to Process Biomass and Make Biochar

Sonoma Ecology Center (SEC), Grant Applicant

www.sonomaecologycenter.org

The Sonoma Ecology center is a 501c3 with a 30-year track record in environmental education, restoration and research activities, as well as grant management.

SEC works to address challenges related to water supply and quality, open space, rural character, biodiversity, energy, climate change, and a better quality of life for all residents. Since 1990, we've worked to increase appreciation and stewardship of Sonoma Valley's natural heritage and create measurable benefits in areas of land, water, climate change and biodiversity.

Vision

We envision a future where people, land, water, and wildlife thrive.

Mission

Our mission is to work with our community to identify and lead actions that achieve and sustain ecological health in Sonoma Valley.

Partial list of biochar and biomass management related projects:

- 1) Produced and hosted 2012 USBI Biochar Conference at Sonoma State University
- 2) Reduced pollution and educated groups of farmers and air districts about the advantages of biochar through conservation burning training (Gallo, Constellation Brands, Jackson Family Wines, Cakebread Cellars; South Coast AQMD, Monterey APCD, San Luis Obispo APCD, Santa Barbara APCD);
- 3) Managed Conservation Innovation Grant (CIG) biochar production and field trials;
- 4) Managed biochar production system for RFFI;
- 5) Researched available pyrolysis and gasification technologies for RFFI;

- 6) Managed CA DWR water conservation grant project;
- 7) Co-founded California Biochar Association;
- 8) Assisted Del Norte County landowner qualify for NRCS Conservation Stewardship program to produce biochar in kilns from fuels reduction materials;
- 9) Assisted local forester select the best technology for his unique situation: Carbonator 500, promoting the machine to local government agencies and land managers;
- 10) Assisting Bay Area tree service company select a technology to convert material they generate that is currently landfilled into biochar, grant writing assistance;
- 11) Assisting Mendocino RCD and All Power Labs site and run eight 25KW gasifiers to convert partially burned materials from the Redwood Complex fire into electricity and biochar;
- 12) Working with CAPCOA on emissions testing protocols for small-scale biochar production techniques;
- 13) Designing and hosting *Scaling Biochar* Forum in September

Admin expenses: 13% to 15% of total grant

Raymond Baltar, MBA Sustainable Enterprise / Project Manager

Director, Sonoma Biochar Initiative

Raymond has served as Biochar Projects Manager at SEC since 2015, and has been Director of the Sonoma Biochar Initiative since 2010. He managed biochar projects for the Redwood Forest Foundation in 2017 and 2018 and is currently helping to manage a CalFire funded biomass power/biochar production project in collaboration with the Mendocino County RCD and All Power Labs. Raymond co-managed an NRCS Conservation Innovation grant in 2013-2014 and is currently project manager for a Department of Water Resources grant on Using Biochar to Conserve Water in California Agriculture.

Hourly billing rate: \$85 an hour.

Collaborative Partner: Redwood Forest Foundation, Inc. / Usal Redwood Forest Company

www.rffi.org

The Redwood Forest Foundation purchased the Usal Forest in 2008 and has been involved in restoration activities ever since. Through their subsidiary, the Usal Redwood Forest Company, they conduct sustainable forestry activities and they have been pioneers in biochar production on the North Coast since 2012.

RFFI's mission is to acquire, protect, restore, and manage forestlands and other related resources in the Redwood Region for the long-term benefit of the communities located there.

RFFI's vision is to establish community-based forests that provide both critical habitat for increased biodiversity and improved regional economic vitality.

The Usal Redwood Forest is a 49,636 acre forest covering two watersheds: the majority of the Usal Creek drainage and the South Fork of the Eel River. The western property boundary is formed by the Usal County Road running along Timber Ridge and is separated from the Pacific Ocean by the Sinkyone Wilderness State Park and the Intertribal Sinkyone Wilderness. The eastern property boundary is primarily defined by the South Fork of the Eel River drainage and the Highway 101 corridor. The southern property boundary is bisected by State Highway 1. To the north, the Usal Forest is bounded by private property and the Mendocino/Humboldt County line.

The Usal Redwood Forest Company (URFC) is a wholly-owned subsidiary of the Redwood Forest Foundation, Inc. (RFFI). RFFI was incorporated in 1997 in the State of California and is an IRS-recognized 501(c)(3) public benefit nonprofit corporation.

Billing rates vary depending on position. Quotes for work outlined shown in budget line items.

Collaborative Partner: Pepperwood Preserve
www.pepperwoodpreserve.org

Pepperwood is a leader in forging solutions to advance the health of California's land, water, and wildlife. Our mission is to advance science-based conservation throughout our region and beyond. Pepperwood delivers innovative research, serves as a demonstration site for rangeland and forest management, and provides inquiry-based environmental education for all ages.

Our 3,200-acre preserve (Sonoma County, CA) is a living laboratory for students, volunteers, families, scientists and land managers to engage in applied research and land management. Founded in 2005 by Jane and Herb Dwight, the Pepperwood Foundation owns and operates the preserve and the Dwight Center for Conservation Science. The California Academy of Sciences owned and managed the preserve from 1978-2005 and continues to use the preserve for programs. The preserve is an important refuge for over 750 varieties of plants and 150 species of wildlife including birds, reptiles, and mammals. The 9,400 square-foot Dwight Center is a LEED-certified facility serving approximately 15,000 visitors per year.

Billing rates vary depending on position. Quotes for work outlined shown in budget line items.

Kiln Manufacturing Company:
<https://www.slagfactory.com/welding-and-fabrication/>
Chico, CA

Water Trailer Manufacturer:
<https://www.clarionmunicipal.com/water-trailers.html>



Raymond Baltar
Biochar Projects Manager
Sonoma Ecology Center
15000 Arnold Dr,
Eldridge, CA 95431

March 10, 2020

Dear Mr. Baltar,

The Pepperwood Foundation would be pleased to partner with the Sonoma Ecology Center's Biochar Project and participate in the *Biochar Demonstration Project: Use of Basic Field Kilns*. Pepperwood owns and manages a 3,200 acre preserve in northeastern Sonoma County. Pepperwood is a 501(c)(3) non-profit.

Our forest thinning projects create a substantial volume of slash that could be utilized for the biochar demonstration project. We thin small Douglas fir trees growing in oak woodlands. We also have started removing excess fuels from vegetation killed in the Tubbs fire in October 2017. The Natural Resource Conservation Service's EQIP program and a grant from the California Department of Fish and Wildlife are partially funding our thinning work over the next three years. Slash from our project is removed via prescribed fire or pile burning. We are pleased to experiment with making biochar as a healthy alternative to our current practices.

Pepperwood would provide a crew to demonstrate the use of the kilns, follow monitoring protocol and coordinate operating them with a contractor utilizing the slash from our forest management projects.

We appreciate the opportunity to cooperate on this innovative and timely project.

Sincerely,

Michael Gillogly
Preserve Manager
Pepperwood Foundation

REDWOOD FOREST FOUNDATION, INC

PO Box 12 Mendocino, California 95460 Phone: 707-593-6150 Email: info@rffi.org www. rffi.org



Raymond Baltar
Biochar Projects Manager
Sonoma Ecology Center
15000 Arnold Dr,
Eldridge, CA 95431

March 13, 2020

Dear Mr. Baltar,

Redwood Forest Foundation, Inc (RFFI) would be pleased to partner with the Sonoma Ecology Center's Biochar Project and participate in the *Biochar Demonstration Project: Use of Portable Field Kilns to Process Biomass and Make Biochar*.

RFFI, through its subsidiary, Usal Redwood Forest Company, owns and manages a 49,564 acre redwood forest in northwestern Mendocino County. Having been intensively managed by industrial timber companies, RFFI is now committed to restoration practices and ecological forestry in attempts to improve the health of Usal Redwood Forest while continuing to support the local community. RFFI is very interested in testing the feasibility of biochar processing and application in a large forest setting to address the heavy fuel loads and forest health on the property.

For this project, RFFI has identified two locations within a proposed shaded fuel break where a crew will operate kilns to process excess fuel from old slash piles and hazardous fuels thinned from nearby over-dense stands. Biochar produced from the kilns will then be applied to forest soils within the treated areas with the intent of increasing soil water holding capabilities.

RFFI is able to provide a \$5000 match towards the cost of this project and another \$5000 match from our Weyerhaeuser Family Foundation grant for administration and review of this project's activities on Usal Redwood Forest.

Thank you for this opportunity.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Linwood Gill', is written over the word 'Sincerely,'.

Linwood Gill
Chief Forester
linwood@rffi.org
(707)357-8371

NCRP DEMONSTRATION PROJECT AND PROCESSES CONCEPT PROPOSAL BUDGET AND SCHEDULE

Sonoma Ecology Center Project Name: Use of Portable Field Kilns to Process Biomass and Make Biochar

Major Tasks	Task Description	NCRP Task Budget	Funding Match *	Total Task Budget	Scaled NCRP Budget **	Start Date	End Date
Project Administration	The Sonoma Ecology Center will sign sub-grantee agreement(s) for work to be completed on this project. Develop invoices with support documentation, conduct ongoing fiscal oversight, do quarterly billing	\$17,187	\$0	\$17,187	\$18,926	7/1/20	6/15/21
Project Management	General project oversight, assist with project reporting 150 to 160 hrs@\$85	\$12,750	\$0	\$12,750	\$13,600	7/1/20	6/15/21
Purchase Kilns	Have 6 Oregon Kilns and 6 Ring of Fire kilns fabricated	\$13,000	\$0	\$13,000	\$13,000	9/1/20	10/1/20
Purchase Trailer	Purchase used flatbed trailer to haul kilns	\$10,000	\$0	\$10,000	\$10,000	9/1/20	9/1/20
Purchase Water Tank and trailer	Expense for trailer mounted water tank and sprayer hose. https://www.water-storage-containers.com/water-trailers-for-sale.html	\$11,757	\$0	\$11,757	\$11,757	9/1/20	9/1/20
Project Reporting	Data collection, performance measures, and project reporting of outcomes/lessons learned (\$3000 each partner)	\$4,000	\$0	\$4,000	\$6,000	7/1/20	6/15/21
RFFI Biomass Harvest and staging	Harvest slash and stage near kilns	\$40,000	\$5,000	\$45,000	\$45,000	7/1/20	11/1/20
Processing slash with the kilns	4 people/ 6 Weeks, RFFI, Usal Forest	\$30,000	\$5,000	\$35,000	\$35,000	12/1/20	1/15/21
Kiln Training	Train crews in kiln use	\$2,500	\$0	\$2,500	\$2,500	12/1/20	12/2/20
Distribute biochar	Spread Biochar in Forest	\$10,000	\$0	\$10,000	\$10,000	1/15/21	5/1/21
Other Forestry Group Biomass harvest and staging (Pepperwood)	Harvest slash and stage near kilns	\$0	\$0	\$0	\$40,000	7/1/20	11/1/20
Processing slash with the kilns (Pepperwood)	4 people/ 6 Weeks, RFFI, Usal Forest	\$0	\$0	\$0	\$30,000	1/15/21	3/1/21
Distribute biochar (Pepperwood)	Spread Biochar in Forest	\$0	\$0	\$0	\$10,000	3/1/21	5/1/21
Tools	Assortment of tools, gloves, Fire resistant shirts	\$1,200		\$1,200	\$1,200	11/1/20	11/1/20
Project Closeout		\$2,500	\$0	\$2,500	\$2,500	5/1/21	6/15/21
Total NCRP 2020 Demonstration Project Request		\$154,894	\$10,000	\$164,894	\$249,483		

NCRP DEMONSTRATION PROJECT AND PROCESSES CONCEPT PROPOSAL BUDGET AND SCHEDULE

Sonoma Ecology Center Project Name: Use of Portable Field Kilns to Process Biomass and Make Biochar

*** List the sources and status of matching funds:**

Redwood Forest Foundation, Inc.: \$5,000 in Match is available from a Weyerhaeuser Family Foundation grant for common oversight and admin,, and \$5,000 from the Usal Redwood Forest Company (URFC) budget for slash processing

Pepperwod Preserve: If the Pepperwood location is funded, Pepperwood would add \$40,000 in match forest stand improvement funding from their NRCS EQIP program

Sonoma Ecology Center: If the Pepperwood location is funded Sonoma Ecology Center would provide \$11,000 in match funding for additional admin expenses.

Project scalability information for the reviewers: The Usal Redwood Forest Company, owned by the Redwood Forest Foundation Inc., has committed to experimenting with the kilns as an alternative to their current slash reduction activities (open burn piles). The Pepperwood Preserve has also expressed an interest in using the kilns to process some of their materials into biochar, and if funding is available they would like to be a second parter on this grant. In the future, there are several other organizations that have also expressed an interest in using the kilns, including Audubon Canyon Ranch and Jenner Headlands Preserve.



North Coast Resource Partnership

Exhibit C

Sonoma Ecology Center Concept Proposal for Biochar Demonstration Use of Portable Field Kilns to Process Biomass and Make Biochar

1) Project Description

With the current influx of money and attention being dedicated to fuels reduction and fire safety within California's urban/wildlands interface, huge volumes of woody slash materials need to be managed. Traditionally, such low-value materials are often torched in open burn piles, creating smoke pollution in local communities and releasing into the atmosphere nearly all of the carbon dioxide contained in these plant materials.

This project will demonstrate use of a special "flame-cap kiln processing unit" containing 12 specialized portable metal kilns to process forest slash onsite -- converting up to 20% of the biomass into biochar available for improved soil health and carbon sequestration. Our proposed mobile system includes a trailer to haul the kilns from location to location; a portable 1,000-gallon water tank mounted on a separate tow-behind trailer, a hose and sprayer needed to extinguish the fires safely; and tools needed for the field team to manage the burn process. We will demonstrate the value of this approach as an alternative to standard practices.

We will demonstrate two different kiln designs using multiple kilns in each case. The smaller *Oregon Kiln* has a low, trapezoidal design with a 20-square-foot base and 2-foot sides. It will be deployed with six units. The larger round "Ring of Fire" kiln is made by bolting together 5 sections of sheet steel (each 44"x 86") with 2" flanges. This design allows the field team to process larger logs and overall a larger volume of materials per day. We will also deploy six of these units.



Dimensions: 5 foot top base; 4 foot bottom base, 2 feet high

Oregon Kiln



Ring of Fire Kiln

Our “kiln kit” will be used by either one or two different organizations (depending on available funding) to process materials over the one-year grant period. The Redwood Forest Foundation, Inc. will use the kilns to process materials thinned from the Usal Forest in Mendocino County. The Pepperwood Preserve property in Sonoma County is our second location if we receive the scaled funding.

Our research team will document the benefits, limitations, and effectiveness of each kiln design as compared to traditional open burn techniques. Data to be collected will include extent of labor required, approximate amounts of biomass processed and biochar produced, and information on where and how biochar was applied. Our biochar applications will be prioritized in areas of the forest with the poorest soil health, with these areas monitored for the duration of the grant period to determine changes, if any, here as compared to adjacent areas with no biochar application.

Specific Project Goals/Objectives

This project's goals may be summarized as follows:

- demonstrate the differences between traditional ways of managing forest slash (open burn piles) and this new approach using two different types of kilns;
- document the costs of using portable kilns to manage forest slash;
- record visual air emissions differences from open burning associated with using kilns for slash management;
- demonstrate the ability to make biochar from forest slash materials within the forests themselves, recording amounts made over each one-month period; and
- demonstrate application of the biochar within these same forests.

Project Relevance to NCRP Goals and Objectives and Block Grant

NCRP is focused on finding and demonstrating better ways to manage our forests while reducing forest fire risks. This project directly addresses this objective by using transportable kilns to successfully process slash within the forests from which it has been cut while achieving “carbon negative” progress by burying the elemental carbon (“biochar”) made by in-kiln pyrolysis. These kilns can be manufactured inexpensively. Since they are available right now from a manufacturer in Chico, CA, their use could easily be scaled if they are demonstrated to be cost effective. Such use could sequester additional carbon in the forest environment. In the Pacific Northwest biochar filters are being used to keep water clean for salmon by removing zinc, copper, iron, oil and other pollutants that harm salmon eggs. This effort could be replicated here on the North Coast.

Project Expansion: Scalable, Replicable, Measurable, Innovative, Enhanced Outcomes

Scalable: Once deemed cost/effective, these multiple-kiln units could easily be replicated and scaled for use throughout the forest environment. Multiple basic kilns with trailers could be made available to reduce large volumes of carbon dioxide that would otherwise be released from traditional slash reduction activities. A number of additional agencies, including Audubon Canyon Ranch and the Jenner Headlands Preserve have expressed an interest in potentially using these kilns to reduce pollution and produce biochar. Funding this grant project will allow extensive data to be collected by one or two different organizations, leading to a more complete picture of the cost effectiveness of using these kilns in California forestry operations. We hope that Sonoma Ecology Center will be able to retain the 12 kilns and 2 trailers purchased for this demonstration effort for future forestry work done by our organization and others.

Measurable: The project will track its results through a variety of key measures. We will document costs to purchase, move and use the kilns in several different settings – overall labor; time to prepare biomass for the kilns vs. using open burn piles; time to carry out the kiln burns; and time needed to apply the biochar to nearby soils. Visual records, both photographs and short videos, will be taken and included with the final report. Costs will be tracked. Finally, visual differences, if any, between plant life and vigor in biochar-applied areas vs. non-applied areas will be described and recorded.

Innovative: This effort recognizes that materials once considered wastes have agronomic value and can even increase forest health. While a few kilns like these have been used sporadically to date in Oregon and California, they have never before been tested at the comparative scale proposed here. We will examine two different sizes and types of kiln to determine which works most efficiently in a variety of situations.

Enhanced: Our goal is to enhance the usefulness of low-value materials long considered un-merchantable and our ability to improve forest health while significantly reducing fire risks and sequestering carbon.

Need for Project: Relevance to Forest Health and Climate Change

Improved forest health is vital throughout the US, and especially in California where recent horrific wildfires have occurred with devastating results. Biochar, a stable form of elemental carbon that can persist for centuries in soil without significant degradation, can be made from materials culled from fire-damaged landscapes as well as from fuels reduction slash materials created during fire risk-reduction activities. The IPCC has recognized biochar production as one of the least expensive and most easily scaled “natural” carbon negative activities, and biochar was similarly recognized in a recent report from the Lawrence Livermore National Laboratory financed by ClimateWorks.

This demonstration project to gather statistical and economic feasibility information on use of these kilns in real-world applications in a variety of environments could lead to additional investments in these types of low-cost, in-forest materials processing technologies, thereby increasing our overall carbon sequestration actions.

Project Location, Size, Communities Served

Usal Forest: a 49,636-acre community forest in Mendocino County managed by the Redwood Forest Foundation, Inc. 2 locations are under consideration for using the kilns: a 20-acre location: Saddle above Julias Opening off of WRP; and Millbank, off Highway One near Leggett.

Pepperwood Preserve: a 3,200 acre preserve in Sonoma County managed by the Pepperwood Foundation. Materials from around the preserve will be staged in a central location to be decided.

Project Partnerships and Local/political support

Redwood Forest Foundation, Inc. (RFFI)

RFFI’s mission is to acquire, protect, restore, and manage forestlands and other related resources in the Redwood Region for the long-term benefit of the communities located there. RFFI’s vision is to establish community-based forests that provide both critical habitat for increased biodiversity and improved regional economic vitality.

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Pepperwood Preserve

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We are confident that we can obtain support for this project from both CA Senator Dodd and Sonoma County Supervisor Gorin—time constraints precluded obtaining statements to meet the proposal deadline.

Estimated Measurable Benefits from Project

The main goals of this project include:

- 1) Demonstrating the amounts of biomass that can be processed using each kiln type, and how much biochar is produced. We estimate between 200 and 400 cu yds of biomass would be processed in the kilns at each location and between 30 and 80 cu yds of biochar could be produced.
- 2) Demonstrating how much CO₂ could be diverted from the atmosphere and put back into forest soils. If we assume the dry weight of a cu yd of biochar is 250 lbs, and that each pound of biochar sequesters the equivalent of 3.5 lbs of CO₂, between 26,250 lbs to 70,000 lbs of CO₂ could potentially be sequestered from this use of kilns.
- 3) Demonstrating the costs of using kilns to process forest slash vs. traditional methods of open burn piles or lop-and-scatter.

Relevant Scientific Studies, Plans, and Reports

Effects of biochar application in forest ecosystems on soil properties and greenhouse gas emissions: a review (<https://link.springer.com/article/10.1007%2Fs11368-017-1906-y>)

Potential carbon storage in biochar made from logging residue: Basic principles and Southern Oregon case studies (https://www.forestry.oregonstate.edu/sites/default/files/Biochar_pone2018.pdf)

Understanding and Using Biochar Practice Guidelines developed by the Umpqua Biochar Education Team (<https://drive.google.com/file/d/1qO3PmUJqZNID8wdAJCX-N3xsb5Vtd6dS/view>)

Approach to Data Collection, Performance Measures and Reporting of Outcomes from Project

With the assistance of Sonoma Ecology Center, each organization using the transportable kiln system will keep records of the approximate amounts of biomass processed, biochar produced, and extent of labor and other expenses required to operate the kilns. Each organization will produce a report on their observations and suggestions regarding use of the kilns vs. other traditional methods of biomass processing. They will address whether they recommend further use of this approach and identify which situations are best for such use.